Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-40. (Cancelled)

41. (New) A thermoplastic hydrogel synthesis method, comprising the step of reacting one or more from the list consisting of polyethylene oxide, polyol, and polyamine, with a polyisocyanate and a mono or polyfunctional amine and/or a mono or polyalcohol, wherein the resulting product is in a non-macrogel state.

42. (New) A thermoplastic hydrogel synthesis method, comprising the step of reacting one or more from the list consisting of polyethylene oxide, polyol,and polyamine, and a polyisocyanate and a mono or polyfunctional amine and/or a mono or polyalcohol that is prepared using a range of NCO:OH or NCO:NH2 ratios, wherein the resulting product is in a non-macrogel state.

43. (New) A thermoplastic hydrogel synthesis method as in claim 41, wherein the polyol is polyethylene glycol.

44. (New) A thermoplastic hydrogel synthesis method as in claim 41, wherein the polyol is polypropylene glycol (PPG).

45. (New) A thermoplastic hydrogel synthesis method as in claim 41, wherein the method also comprises the step of end capping unreacted groups with a unit capable of producing hydrogen bonding, π bonding, ionic bonding, hydrophobic bonding and/or phase separation or forming a glassy or crystalline phase separated domain.

46. (New) A thermoplastic hydrogel synthesis method as in claim 41, wherein the method also comprises the step of end capping unreacted groups with a unit from a list of consisting of mono-functional amine, mono-functional isocyanate, mono-functional anhydride, mono-functional acid, a cyclic diacid anhydride, and mono-functional alcohol.

47. (New) A thermoplastic hydrogel synthesis method as in claim 41, wherein a biodegradable unit is incorporated.

48. (New) A thermoplastic hydrogel synthesis method as in claim 47, wherein the biodegradable unit is at least one of polycaprolactone, poly (lactic acid), poly(glycolic) acid or poly(hydroxybutyric)acid, and amine or hydroxyl ended poly(amino) acids (protein or peptide analogues).

49. (New) A thermoplastic hydrogel synthesis method as in claim 41, wherein the ratios of the components are selected such that, at the end of the reaction, the product does not form a macrogel.

50. (New) A thermoplastic hydrogel synthesis method as in claim 41, wherein the reaction is prepared using a range of NCO:OH or NCO:NH2 ratios from 2:1 to 1:2.

51. (New) A thermoplastic hydrogel synthesis method as in claim 41, wherein the first step reaction is prepared using NCO:OH or NCO:NH2 ratios of 2.0:1 to 1:1.8 and 1.8:1 to 1:1.8.

52. (New) A thermoplastic hydrogel synthesis method as claim 41, wherein both OH and NH2 groups are used within the single reaction, and wherein a NCO:(OH+NH2) ratio is within a range of 2:1 to 1:2.

53. (New) A thermoplastic hydrogel synthesis method as in claim 41, wherein the range of ratios used may be extended by the addition of monofunctional amines, alcohols or isocyanates.

54. (New) A thermoplastic hydrogel synthesis method as in claim 41, wherein a macrogel is prevented from forming by stopping the reaction before completion.

55. (New) A thermoplastic hydrogel synthesis method as in claim 54, wherein the reaction is stopped by the addition of a monoamine, an amine terminated polymer, a mono-alcohol or an alcohol terminated polymer.

56. (New) A thermoplastic hydrogel synthesis method as in claim 55, wherein the monoamine, amine terminated polymer, mono-alchol or alcohol terminated polymer is added when the reaction is partially complete.

57. (New) A thermoplastic hydrogel synthesis method as in claim 41, wherein an amine or alcohol is admixed at the outset thus removing the possibility of gelation.

58. (New) A thermoplastic hydrogel synthesis method as in claim 57, wherein an amine is added in the form of amine carbonate.

59. (New) A thermoplastic hydrogel synthesis method as in claim 41, wherein products with NCO end groups are subjected to a final curing by immersion in liquid water or steam.

60. (New) A thermoplastic hydrogel synthesis method as in claim 41, wherein any unreacted groups are capped with an amine.

61. (New) A thermoplastic hydrogel synthesis method as in claim 60, wherein unreacted OH groups are endcapped.

62. (New) A thermoplastic hydrogel synthesis method as in claim 60, wherein unreacted NCO groups are endcapped.

63. (New) A thermoplastic hydrogel synthesis method as in claim 60, wherein terminal NCO groups are converted into strongly hydrogen bonding urea groups.

64. (New) A thermoplastic hydrogel synthesis method as in claim 60, wherein unreacted groups are capped with an aliphatic amine.

65. (New) A thermoplastic hydrogel synthesis method as in claim 64, wherein the amine group is attached to a long linear or branched alkyl group or to an aryl- or aralkyl-amine.

66. (New) A thermoplastic hydrogel synthesis method as in claim 64, wherein the amine group is attached to polymers or low molecular weight pre-polymers.

67. (New) A thermoplastic hydrogel synthesis method as in claim 60, wherein excess OH groups are capped with one or more molecules from the list consisting of mono-isocyanate ended aromatic molecules, mono-acid anhydride ended aromatic molecules, mono-isocyanate ended aliphatic molecules, mono-acid anhydride ended aliphatic molecules, and a reaction product of a monoamine with a di(or higher) isocyanate.

68. (New) A thermoplastic hydrogel synthesis method as in claim 60, wherein the groups used in the endcapping process allow the polymers to interact with physical or chemical cross-linking.

69. (New) A thermoplastic hydrogel produced by the method described in Claim 41.

70. (New) A thermoplastic hydrogel as in claim 69, wherein the hydrogel is completely polymerised under the specific conditions that are being used.

71. (New) A thermoplastic hydrogel as in claim 70, wherein after polymerisation the hydrogel is heated.

72. (New) A thermoplastic hydrogel as in claim 70, wherein after polymerisation the hydrogel is immersed in water liquid or vapour.

73. (New) A thermoplastic hydrogel as in claims 69, wherein the hydrogel is pelletised, pressed, extruded or heat, pressure, injection or compression moulded.

74. (New) A thermoplastic hydrogel as in claims 69, wherein the end product incorporates an antioxidant containing hydroxyl groups.

75. (New) A thermoplastic hydrogel as in claim 74, wherein the antioxidant may be internal or external.

76. (New) A thermoplastic hydrogel as in claims 74, wherein the antioxidant is ascorbic acid.

77. (New) A thermoplastic hydrogel as in claim 74, wherein the antioxidant is 2,6-ditertiarybutyl-4-hyroxyanisole.

78. (New) A thermoplastic hydrogel as in claims 69, wherein the hydrogel develops opacity when swollen in water.

79. (New) A thermoplastic hydrogel as in claim 69, wherein pigments or dye(s) are incorporated into the hydrogel.

80. (New) A thermoplastic hydrogel comprising one or more from the list consisting of polyethylene oxide, polyol, polyamine, a polyisocyanate; a polyfunctional amine and a polyalcohol, and wherein the thermoplastic hydrogel is in a non-macrogel state.

81. (New) A thermoplastic hydrogel comprising one or more from the list consisting of polyethylene oxide, polyol, polyamine, a polyisocyanate, a polyfunctional amine and a polyalcohol, wherein the thermoplastic hydrogel comprises a range of NCO:OH or NCO:NH2 ratios, and wherein the thermoplastic hydrogel is in a non-macrogel state.

82. (New) A thermoplastic hydrogel as in claim 80, wherein the polyol is polyethylene glycol.

83. (New) A thermoplastic hydrogel as in claim 80, wherein the thermoplastic hydrogel also comprises end capping groups capable of producing hydrogen bonding, π bonding, ionic bonding, hydrophobic bonding and/or phase separation or forming a glassy or crystalline phase separated domain.

84. (New) A thermoplastic hydrogel as in claim 80, wherein the thermoplastic hydrogel also comprises end capping groups with a unit from the list consisting of mono-

functional amine, mono-functional isocyanate, mono-functional anhydride, mono-functional acid, a cyclic diacid anhydride, and mono-functional alcohol.

85. (New) A thermoplastic hydrogel as in claim 80, further comprising a biodegradable unit.

86. (New) A thermoplastic hydrogel as in claim 85, wherein the biodegradable unit is at least one of polycaprolactone, poly (lactic acid), poly(glycolic) acid or poly(hydroxybutyric)acid, and amine or hydroxyl ended poly(amino) acids (protein or peptide analogues).

87. (New) A thermoplastic hydrogel as in claim 80, wherein the ratios of the components are selected such that the product does not form a macrogel.

88. (New) A thermoplastic hydrogel as in claim 80, comprising strongly hydrogen bonding urea groups.

89. (New) A thermoplastic hydrogel as in claim 80, further comprising one or more endcapping molecules from the list consisting of mono-isocyanate ended aromatic molecules, mono-acid anhydride ended aromatic molecules, mono-isocyanate ended aliphatic molecules,

mono-acid anhydride ended aliphatic molecules, and a reaction product of a monoamine with a di(or higher) isocyanate.

90. (New) A thermoplastic hydrogel as in claim 80, wherein the hydrogel is completely polymerised.

91. (New) A thermoplastic hydrogel as in Claim 90, wherein the hydrogel is pelletised, pressed, extruded or heat, pressure, injection or compression moulded.

92. (New) A thermoplastic hydrogel as in claim 90, which incorporates an antioxidant containing hydroxyl groups.

93. (New) A thermoplastic hydrogel as in claim 92, wherein the antioxidant is internal or external.

94. (New) A thermoplastic hydrogel as in claim 92, wherein the antioxidant is ascorbic acid.

95. (New) A thermoplastic hydrogel as in claim 92, wherein the antioxidant is 2,6-ditertiarybutyl-4-hyroxyanisole.

96. (New) A thermoplastic hydrogel as in claim 80, wherein the thermoplastic hydrogel incorporates dye(s) or pigments.

97. (New) A contact lens produced from the thermoplastic hydrogel of claim 69.

98. (New) A prosthetic lens or cosmetic lens produced from the thermoplastic hydrogel of claim 69.